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Brief 65-10060

NASA TECH BRIEF

New Alloy Brazes Titanium to Stainless Steel

The problem: Brazing titanium to stainless steel without embrittling the metals at the brazed interfaces. The fusion point of the brazing alloy must not exceed 1685°F, since titanium becomes undesirably brittle above this temperature (beta transition temperature of pure titanium). Although there are a number of alloys that can be used for brazing titanium below the beta transition temperature, they do not meet all of the following additional NASA requirements: (1) The brazing alloy must be inert to nitric acid; (2) it must form a high-strength bond; (3) under vacuum test, helium leakage through the sealed joint must not exceed approximately 0.63 cc per year; (4) the alloy must metallurgically bond to titanium and stainless steel without the formation of undesirable compounds at the interfaces.

The solution: A brazing alloy having the following composition in percent by weight: 81.1 palladium, 14.3 silver, 4.6 silicon.

Tests performed with samples of this alloy have yielded the following results: (1) The homogeneous solid is inert to nitric acid; (2) the sealed joint meets specifications for operation under high vacuum; (3) the ultimate tensile strength of the joint is approximately 75,000 psi; (4) the alloy forms a metallurgical bond, with alloy interfacial penetration of 0.0015 inch into titanium and 0.003 inch into stainless steel; (5) it has excellent flow characteristics at a brazing temperature in the range of 1395°F to 1450°F.

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P.O. Box 1537
Houston, Texas, 77001
Reference: B65-10060

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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